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**PROGRESS REPORT - OPERABLE UNIT 4 - SILOS 1-4 - MARCH
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Environmental Management Project

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Remedial Investigation/ Feasibility Study

PROGRESS REPORT

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Operable Unit 4 SILOS 1-4

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Introduction

The U.S. Department of Energy's (DOE) Fernald Environmental Management Project site is divided into five sections, known as operable units, for environmental investigation and cleanup. The operable units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup.

Located at the western periphery of the Fernald site, "Operable Unit 4" is defined as a geographic area that includes Silos 1 and 2 (K-65 Silos), Silo 3 (metal oxide silo), the unused Silo 4, and ancillary structures. Operable Unit 4 remediation will address each of these structures, any contaminated soils within the geographic boundary, and any contaminated perched water encountered during Operable Unit 4 remedial activities.

Background

Silos 1 and 2, commonly called the "K-65 Silos," contain radium-bearing, low-level radioactive wastes dating back to the 1950s. In 1964, the two silos were reinforced with an earthen berm, which was upgraded in 1983. Other improvements which have been made include a 30-foot cap installed on top of the silo domes for added protection, and a polyurethane foam coating that was applied over the domes for weather protection. In addition, a radon treatment system was constructed, and radon gas monitors were installed around the Fernald site boundary and in the immediate vicinity of Silos 1 and 2. Silo 3 contains dried uranium-bearing wastes, and Silo 4 is empty.

Remedial Investigation/Feasibility Study

The Remedial Investigation/Feasibility Study (RI/FS), a "blueprint" for Operable Unit 4 cleanup was completed with U.S. EPA approval and signing of a final Record of Decision (ROD), which outlines the selected cleanup remedy. During the RI/FS, the nature and extent of contamination within the Operable Unit 4 boundary was thoroughly investigated so appropriate remedial actions could be formulated and implemented.

Site Characterization

Data from the analyses of samples collected during site characterization activities associated with Operable Unit 4 are compiled in the U.S. EPA-approved Remedial Investigation report and the Feasibility Study/Proposed Plan-Draft Environmental Impact Statement for Operable Unit 4. Site characterization field activities included the completion of borings in the earthen berms surrounding the silos, the soils beneath the silos, and the contents of the concrete structures.

Above-background concentrations of radionuclides and other contaminants were identified in surface and subsurface soils, sediment and surface water, and groundwater within and adjacent to the Operable Unit 4 study area.

U.S. EPA approves final Record of Decision for Remedial Action

On December 7, 1994, U.S. EPA approved the final *Record of Decision for Remedial*

Action at Operable Unit 4. Major components of the selected remedy for Operable Unit 4 include:

Removal of the contents of Silos 1, 2, and 3 (K-65 residues and cold metal oxides) and the decant sump tank sludge.

Vitrification (glassification) to stabilize the residues and sludges removed from the silos and decant sump tank.

Shipment of the vitrified contents of Silos 1, 2, 3, and the decant sump tank for disposal at the Nevada Test Site (NTS), near Las Vegas.

Demolition of Silos 1, 2, 3 and 4, and decontamination -- to the extent practicable -- of concrete rubble, piping, and other construction debris generated.

Removal of the earthen berms and excavation of contaminated soils within the Operable Unit 4 boundary to achieve proposed remediation levels. Placement of clean backfill following excavation.

Segregation of non-contaminated soils and demolition of the vitrification treatment unit and associated facilities after use. Decontamination or recycling of debris prior to disposition.

On-property interim storage of excavated contaminated soils and remaining contaminated debris in a manner consistent with the approved work plan for Improved Storage of Soil and Debris (Removal Action No. 17).

Pumping and treatment of any contaminated perched water encountered during remedial activities.

The overall objective of Operable Unit 4 remedial actions is to safely remove a known source of contamination, which will reduce the potential for release of hazardous substances, including radionuclides, to the environment, thereby alleviating a potential risk to human health. Substantial risk reduction will be achieved by removing the sources of contamination, treating the material for which exposures result in the highest risk, shipping the treated residues off

site for disposal, and managing remaining contaminated soils and debris consistent with a sitewide strategy. Vitrification (glassification) will reduce the mobility of hazardous constituents and will significantly reduce the volume of materials requiring disposal.

Operable Unit 4 remedial actions entail removing the materials from Silos 1, 2, and 3 and treating them in a vitrification facility to be constructed at the Fernald site. Sludge from the decant sump tank, which collects liquids from in and around the silos, will also be removed and treated in the vitrification facility. Following treatment, the vitrified residues will be containerized and transported and disposed at the NTS, near Las Vegas.

After the residues are removed from the silos, the concrete structures, radon treatment system and other structures within Operable Unit 4 will be demolished. Following completion of treatment, the vitrification facility will be disassembled. Surface scabbling, acid washing and other standard decontamination technologies will be applied, to the extent practical, to minimize the volume of waste requiring disposal. Opportunities for recycling materials will also be explored.

Contaminated soils within Operable Unit 4 will be excavated; it is anticipated that a minimum depth of 6 inches will be removed from the Operable Unit 4 area. Clean fill will be placed in excavated areas, which will then be seeded. Contaminated Operable Unit 4 soil and debris will be placed in an on-site storage facility. As required, the storage facility will be maintained and monitored.

Following application of available waste minimization processes, remaining Operable Unit 4 contaminated soil and debris will be disposed consistent with the selected remedies for Operable Units 3 and 5, respectively.

Operable Unit 4 remediation is anticipated to require approximately six years and \$91.7 million, based on the assumptions in the *Final Record of Decision for Operable Unit 4*.

Remedial Design Activities

DOE submitted the *Work Plan for Operable Unit 4 Remedial Design* to U.S. EPA on January 26. On February 27, DOE received

conditional approval from Ohio EPA, pending satisfactory resolution of the agency's comments. U.S. EPA approval of the document is anticipated by May 10, 1995.

The remedial design work plan identifies and defines the activities required to develop final construction plans, specifications and bid documents for implementation of the selected remedial action for Operable Unit 4.

Other Activities

Vitrification Pilot Plant construction to be completed in August

Operable Unit 4 is about to begin conducting a pilot-scale treatability study consisting of removing and vitrifying K-65 materials and bentonite clay from Silo 2, as well as material from Silo 3. Previous bench- and laboratory-scale vitrification studies with K-65 and Silo 3 materials produced positive results. The pilot-scale test will result in development of final Operable Unit 4 vitrification processes and full-scale vitrification plant design. Construction of the pilot-scale vitrification facility began July 17, 1994, and is scheduled for completion in August 1995.

The Operable Unit 4 Vitrification Pilot Plant Treatability Study will be conducted in two phases to demonstrate continuous, 24-hour operation of the vitrification furnace. Other objectives are to verify that the formulations developed from the previous Operable Unit 4 bench-scale studies and glass-development program will produce a satisfactory glass product, and to ensure compliance with the acceptance criteria for disposal at the Nevada Test Site.

Phase I operations will verify the adequacy of the equipment, process and methodology of waste retrieval and the vitrification facility. Scheduled to begin in September, Phase I testing with non-radioactive, surrogate materials is expected to require approximately two months to complete.

During Phase I, bentonite and surrogate materials will be utilized in the vitrification facility to perform integrated system operability testing prior to operating with actual silo residues. Before entering the vitrification furnace, metallic compounds will be added to the surrogate material to more closely simulate K-65 material. No surrogate material will be used to demonstrate Silo 3 material. Phase I is estimated to require approximately 20-30 metric tons of surrogate material to adequately demonstrate vitrification.

Phase II: By March 1996, Phase II operations will begin with radioactive materials retrieved from Silos 2 and 3. Phase II is estimated to require approximately 20 metric tons of K-65 material and 10 metric tons of Silo 3 material.

From Silo 2, the material will be removed with a manually operated slurry pumping device suspended from a mobile crane over Silo 2. This device will be deployed through an existing manway using a glovebag to maintain the silo in a sealed condition and prevent radon escape into the atmosphere. Material from Silo 3 will be removed pneumatically. Also during Phase II, radon control for Silos 1 or 2 headspace atmosphere, and off-gas treatment for the vitrification facility will be demonstrated. Phase II will require approximately three months to complete. In the future, the Vitrification Pilot Plant may be modified to be utilized as a component of the remedial facility.

For More Information

More information about Operable Unit 4 is available in the Public Environmental Information Center (PEIC), where Fernald Project cleanup documents are kept in the Administrative Record. The PEIC is located in the JAMTEK building, 10845 Hamilton-Cleves Highway, Harrison, Ohio, 45030. For information regarding PEIC operating hours and services, please call (513) 738-0165.